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EMPOWERING PROGRAMMERS

THE SYSTEM UNDERSTANDS CORPORATE PC POLICIES

DOABLE DATABASES

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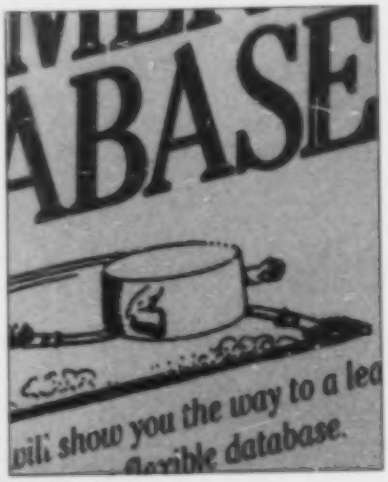

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COVER ILLUSTRATION BY JAMES TENNISON.
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OEM EDITION

Tough to define, this $4.2 billion market will continue to grow in some form at 30% a year.

SUPERMICROS ASCEND TO 32 BITS

by Lamont Wood

Depending on who one talks to, the supermicro market is either the wave of the future or already dead and buried. The market's backers point to the promise of 32 bits on a desktop, now being realized, and the potential of the more powerful computers to offer better performance at lower prices. Its critics say that IBM Corp.'s PC AT will dominate the field, that local area networks will provide supermicros with increasing competition, and that effective distribution channels will be hard to come by. Those who downplay supermicros say the word itself can't even be defined anymore—although somebody sold nearly a quarter of a million systems in 1984 that weren't pcs, minis, or mainframes.

There seems to be a general consensus, however, that if the term must be defined, it means multi-user microcomputers with the latest processors. No one seems comfortable discussing graphics workstations or machines like Apple Computer Inc.'s Macintosh under the supermicro heading, even if these devices do use the same chips.

Market research firm Dataquest Inc. of San Jose lists a total 1984 market of more than 230,000 systems with an if-sold value of $4.2 billion (see Fig. 1). The figures refer not to supermicros, though, but work-group computers—systems that support two to 10 users, a definition Dataquest prefers. Still, the work-group market probably includes most of the supermicro market.

Analysts agree that IBM's 1984 introduction of the AT has confused the market. "Before the AT came along, the supermicro category was well defined," says Ken Bosomworth, president of International Resource Development Inc., a research firm in Norwalk, Conn. "There were 40 to 50 makers of machines that ran from $8,000 or $9,000 on up. But now the AT is more powerful and cheaper than what they offered. The 1983 figures are the last ones that made sense." Adds George Colony, president of Forrester Research Inc. in Cambridge, Mass., "It is difficult to refer to any machine by size anymore."

Others say they can discern a market, however. "We define supermicros as multi-user micros that cost less than $20,000 at entry level and have an industry standard processor chip and open architecture," says Jocelyn Young, senior researcher with Future Computing Inc. in Dallas. And for Creative Strategies International of Cupertino, Calif., a supermicro is "a full 32-bit cpu that can be used in serious office automation," notes Tim P. Bajarin, vice president of microcomputer research at the firm.

But insisting on 32 bits in the supermicro definition may be premature since true 32-bit standard chips like Motorola's 68020 and Intel's 80386 haven't quite arrived, cautions Omri Serlin, editor of *Supermicro Newsletter* in Los Altos, Calif. Machines using the first of these semiconductors are just reaching the announcement stage, while the second chip isn't available yet.

But if the definition of a supermicro is stretched to include proprietary chips, then the enemy is already within the gates with true 32-bit micros like the AT&T 3B2 and the DEC MicroVAX II.

The 3B2 was released in March 1984 as part of AT&T's 3B product line, which reaches up into the higher supermini realms. The machine generally is counted as the supermicro member in the line because, as one AT&T spokesman notes, "it sits on a desk." The basic version with 512K of RAM and a 10MB disk drive costs $9,950. It has expansion slots for 16 terminals and runs Unix System V. And it uses the true 32-bit WE32000 chip, which was considered proprietary until AT&T began marketing it at the end of April.

Available since the beginning of 1985, AT&T's supermicro is not without problems, however. "We have offered the 3B2 since the first of the year, but sales have been limited by the availability of software," says Bruce Grant, manager of technical support for MicroAge Computer Stores Inc., headquartered in Tempe, Ariz. MicroAge is a chain of storefront sales organizations specializing in business computer and phone systems, with more than 150 stores nationwide. It carries several lines of supermicros.

RESULTS OF AT&T REVISIONS

"AT&T revised the operating system at the first of the year, just as the hardware was becoming available," Grant recalls. "They went from Release 1 to Release 2, adding file and record locking. It involved some PROM changes and new operating system software. We lost about 80% of the software that was available under Release 1. The vendors have had to recompile at least and in some cases to make major revisions.

"The 3B2 is not a VAX-like horsepower machine," adds Grant. "There is no hardware floating point and the disks are slow. But it's a good price-performance machine for accounting and database applications," he says. "The first round of application software for it was a disappointment due to hasty porting, but we were able to double the speed of some of it in-house."

Promising to make more of a splash is the MicroVAX II from Digital Equipment Corp. Released in May, the supermicro is the new low end of the VAX product line, which stretches all the way up to the VAX 8600.

Supporting up to 14 users, the price of the MicroVAX II starts at $20,000. The machine is based on a proprietary DEC chip and is said to run three to four times faster than its predecessor, the MicroVAX I, which had a cpu board instead of a chip. It runs the complete VAX instruction set and a subset of the MicroVMS operating system, plus a version of Unix called Ultrix.

DEC, of course, considers the MicroVAX II the greatest thing since sliced bread. "It's the most significant move in the supermicro market in a decade," declares Frank Sebastian, systems marketing manager for DEC's Business Computer Group. Ready to agree with the manufacturer is

3-D ILLUSTRATION BY NICK ARISTOVULOS. PHOTOGRAPH BY SHIG IKEDA

If the definition of a supermicro is stretched to include proprietary chips, then the enemy is within the gates.

Neil Baldridge, vice president of CompuShare Inc., an oem in Lubbock, Texas.

Shortly after the MicroVAX II was announced, Baldridge went to DEC headquarters where he ran his company's accounts receivable software package on the new machine and on both the DEC 11/780 and 11/750. To simulate multiple users, Baldridge used machine-driven input through two ports.

"I was really astonished at how fast it was," Baldridge said. "I thought, 'Oh, sure,' when they said it was in the 11/780 class. But with slow 5.25-inch drives, compared to the high-speed drives on the 11/780, it was 75% the speed of the 11/780. With faster disks, it should approach 85%. And it ran rings around the 11/750, which operated at 60% of the speed of the 11/780. For one-fifth to one-tenth the price," he continued, "you have nearly 80% the performance. We could replace the hardware we have here for a fraction of the original cost."

FIG. 1

TOP 10 SUPERMICRO VENDORS IN 1984

COMPANY	REVENUES ($ MIL.)	MARKET SHARE (%)
Burroughs	545.7	13.0
Altos	243.2	5.8
NCR	178.4	4.2
TeleVideo	176.3	4.2
Fortune Systems	137.5	3.3
Tandy	124.8	3.0
Compupro	124.3	3.0
DEC	83.2	2.0
Molecular	77.6	1.8
Cromemco	74.6	1.8
Others	2,442.4	58.0
Total	4,208.4	

The 1984 market for systems with two to 10 users, based on if-sold value.

COMPANY	UNITS	MARKET SHARE (%)
Burroughs	42,825	18.6
TeleVideo	19,250	8.3
Altos	18,815	8.2
Tandy	14,545	6.3
Fortune Systems	14,015	6.1
Compupro	12,750	5.5
NCR	12,400	5.4
Cromemco	6,725	3.0
DEC	6,378	2.9
Onyx	5,700	2.5
Others	77,292	33.2
	230,695	

The 1984 market for systems with two to 10 users, based on units shipped.

Source: Dataquest

THE FIRST 68020 MACHINE

As for generic 32-bit chips, the first 68020-based machine to be announced appears to be supermicro from Masscomp of Westford, Mass. A 16MHz cpu and memory upgrade board for its 500 Series of computers for the scientific and oem market, the device lists for $7,900. Still, "everybody's working on getting 32 bits," says Allan Wallack, Masscomp vice president. Depending on chip availability, the board probably won't be available until the first half of 1986, he added.

As a result, the first 32-bit supermicro built around a generic chip to reach the market probably came from Altos Computer Systems Inc. of San Jose. Using the 68020, the Altos 3068 was scheduled to be shipped in July. Designed for the oem market and running Unix System V, its price is listed at $7,000 in oem quantities (300 to 400 units). Included will be 1MB of RAM (expandable to 16MB), a 1.2MB floppy, a 20MB hard disk (expandable to 240MB), and a 60MB tape drive. The system can support 10 to 40 ports.

Altos also has a line of multi-user systems based on the Intel 8086 and its children. There's the 486 four-user system for $6,490, the 586 five-user system for $7,990, and the 986 nine-user system for $11,990. Most recently, the company introduced the 2086 20-user system for $19,990. For that price, the oem gets 2MB of RAM, an 80MB hard disk, a 1.2MB floppy, a 60MB backup tape drive, and one terminal. Based on an 80286, the supermicrocomputer can run IBM PC AT software, though it's not billed as an AT clone.

Elsewhere with established 16-bit chips, there's plenty of multi-user micro activity. One of the most active firms in this field is Tandy Corp.'s Radio Shack division, often cited as having the largest installed base of multi-user micros—perhaps as many as 40,000 systems—with its Model 6000 (known earlier as the Model 16). Running Xenix with an 8MHz 68000, plus a Z80 chip for I/O handling, the 6000 can support up to six users. Its base price is $4,499 for a system with 512K RAM and two 8-inch diskette drives.

The attraction of multi-user micros is simple; the key is high-speed file sharing, claims Ed Juge, director of marketing planning at Radio Shack. While this feature is commonly available with multi-user systems, it's still not found on local area networks.

"With most network software, your file is locked, not just the record," says Juge. "With record locking, Joe can be changing inventory items 78 and 79, and I can be changing item 80. Under file locking, if Joe is changing something, I can't get in at all. But if I'm on the phone selling something and I see there's only one left in inventory, I want to make sure that Joe didn't sell it five minutes ago."

On the other hand, some vendors have been coming out with systems that look a lot like local area networks—multi-user clusters with a file server supporting slave pcs. Burroughs, for instance, offers the B25, which uses the 80186 and is oemed from Convergent Technologies of San Jose. A diskless workstation with 512K costs $3,195, and a workstation with a 20MB hard disk costs $7,600. The master unit—an XE 550 Shared Resource System—costs $21,000 with a 37MB hard disk.

"We've been very happy with the response time," says Dana Reiman, data administrator of materials systems at Boeing Aerospace Co. in Seattle, Wash. Reiman uses 21 clusters with the B25 and

Multi-user micros have a major advantage over LANs—cost. It's cheaper to buy terminals than pcs.

earlier B21 models. "We had trouble doing data entry for our mainframe using pcs for data collection, and we needed file sharing for administrative purposes," he explains.

But beyond record locking and related concerns, multi-user micros have another major advantage over LANs—cost. It's cheaper to buy terminals than pcs. Ron Wong, manager of office automation systems for Ford Motor Co. in Dearborn, Mich., where they installed 700 Fortune 32:16 processors with 2,000 workstations during the course of 1984, said cost was a major factor in their decision to get multi-user systems.

"At the time, we felt the multi-user systems looked better cost-wise," Wong recalls. "We wanted the ability to have electronic mail and file transfers, but the traffic in a lot of the smaller work groups wasn't enough to justify a LAN. And we wanted Unix for engineering purposes," Wong adds. "We've been quite pleased with their performance." File transfers and electronic mail between systems is done through modems.

Fortune Systems Corp. of Redwood City, Calif., offers several versions of its 32:16 system, which uses a 68000 processor. The five-user PS system lists for $6,995; the 13-user XP system's base price is $9,995; and the new SX with a 12MHz chip, supporting 17 users, lists for $11,995.

Reaching the lower end of the multi-user micro market is, of course, Big Blue with its AT, which debuted last August. Based on an 80286 chip, the AT can use Microsoft's workalike version of Unix, called Xenix, to support three users—one on the console and two through serial ports. (Third parties are offering expansion boards that will enable the machine to support more users.) To run Xenix, which costs $395, the AT needs 512K of RAM, a 20MB hard disk, and a 1.2 MB floppy. It can support three terminals—the console, a second terminal connected through the serial port, and a third through the modem port. AT&T was careful to say that it can support nine users—meaning nine user IDs can be active. (No clones have come to light. But with Unix as a software standard, hardware cloning is superfluous.)

PUSH IS ON FOR 32 BITS

As for the future, there's a general agreement that the push is on toward 32 bits by nearly every vendor: "If the competition is advertising 32 bits, then it becomes one of those boxes you have to be able to check when the bid request form comes out," notes Rich Siegel, senior director of product marketing at Fortune Systems.

But Siegel also believes that going to 32 bits is worth it for its own sake. He points to Fortune's 68020 project, called Belmont, which showed that a move to 32 bits could double the number of effective users (from 12 to 24) a Fortune 32:16 SX could support.

But there's also a consensus that after 32 bits are reached, the market will have to look elsewhere for excitement. "Our planning assumptions are that the market will reach a plateau with 32 bits, and after that, further breakthroughs will come about through parallelism," says Bob Marsh, chairman of Plexus Computers Inc. of San Jose. Plexus sells a range of supermicros, starting at $9,000 for an eight-user 68000 machine with 512K of RAM and a 12MB hard disk running Unix.

"You can go two to three times faster than generic chips using reduced instruction set computers, but that's tuning, not an order-of-magnitude breakthrough," Marsh explains.

Meanwhile, there's the LAN competition to contend with, notes Juge of Radio Shack. "The future depends on how the LAN software shakes out," he says. "There's a limited number of software packages available in the Xenix and Unix environment, but what's there was designed for multi-user work. PC costs are coming down, so the price advantage of multi-user systems over LANs is disappearing. But there are an awful lot of people around who really like Unix and Xenix." Further, new ideas for distribution channels are needed, says Marsh. The var/oem formula may be the easiest answer, but no longer the best. "Everybody seems to be looking for third parties who are experts in a given applications area, who can develop software and oem hardware," Marsh points out. "But such people are usually underfinanced and lack technological sophistication and are the least prepared to build a national distribution network. And there is no channel for exploiting well-defined but limited opportunities, like the man who came to see me with software for dialysis clinics. There are only 200 such clinics."

IBM's presence on the playing field may prove to be the greatest challenge facing supermicro makers. Analyst Bosomworth considers Big Blue's arrival as the beginning of the end for the others. "The opportunity that did exist for small vendors to make high-powered machines has evaporated with the AT," he contends.

James Renalds, an industry analyst with Dataquest, is more optimistic. "It's still a very wide-open market, which is why you see big vendors getting in," he says. That it is wide open is clear from the fact that market leader Burroughs has only a 13% share of the $4.2 billion market.

"But there are big challenges," he adds. "We are already starting to see mergers and rumblings. The AT will give some growth to the market but, in the long term, it will make many vendors decide not to participate."

Nearly every analyst predicts that the market itself will keep on growing, though. Renalds forecasts an annual growth rate of 28% between 1985 and 1987. Future Computing Inc. of Dallas is even more bullish, estimating a 36.2% annual growth rate. Supermicros, says Alan T. Hald, chairman of MicroAge, are "a growth market in the future." Beyond these glowing forecasts, however, only one thing seems clear and that is that the industry will get 32 bits—and more uncertainty. ◉

"I didn't come here to beg."

CARTOON BY STEVE ATTOE

Lamont Wood is a free-lance writer based in San Antonio.

A new survey ranks the largest value-added resellers in the U.S.

THE TOP 10 VARS

by Edith Holmes

The problem is one of definitions. At what point does a systems house become a systems integrator, or a systems integrator a value-added reseller? The lines blurred for us in pulling the top 10 vars from Technical Publishing Co.'s annual survey of systems houses and computer oems.

Our definition and the rationale behind DATAMATION's list of leading vars is as follows:

• We omitted computer makers. Thus Sperry, Burroughs, and NCR, all of which appeared at the top of a ranking based solely on the value of computer systems sold, are left out. Also out of the running are smaller firms, such as Monroe Systems for Business in Morris Plains, N.J., and Syntrex Inc. in Eatontown, N.J., both of which design and have a hand in the manufacture of the micros they sell with vertical solutions.

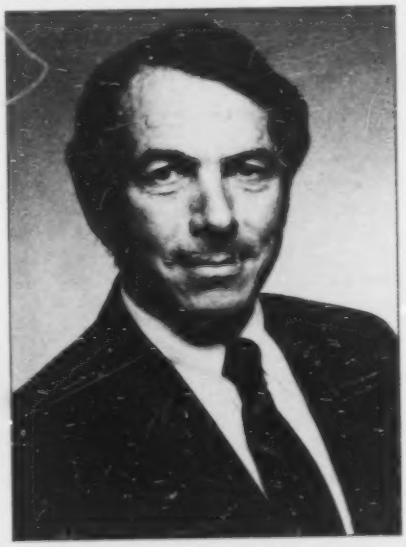
• We also eliminated major computer users such as Rockwell International and large distributors such as Arrow Electronics, since these companies and others like them are not—and are quick to confirm they are not—in the business of buying hardware made by others, packaging it with software and services, and reselling it. Often the large quantities of computers purchased by these firms were for in-house use.

• We included companies whose businesses encompass but go considerably beyond value-added remarketing. And so XL/Datacomp Inc., which packages a variety of services with used IBM equipment for resale to the midrange market, is on the list, as is Istel Inc., which also runs communications networks and offers facilities management services. And we kept on the list those firms that offer many services with the hardware they purchase from others, but no applications software—companies like Federal Computer Corp. and Federal Systems Inc.

With these caveats, then, we offer a list of the top 10 vars (see Fig. 1). Five of the 10 are profiled in depth here. Two of the companies—Istel Inc. and SHL Systemhouse, Inc.—have parent firms outside the United States, specifically in the U.K. and Canada. This ranking also includes a surprising number of vars that have specialized in the manufacturing marketplace. Three of the five organizations profiled here—Ask Computer Systems Inc., XL/Datacomp, and Istel—have set their sights on this field alone.

ASK COMPUTER

For Ask Computer Systems Inc., number one on DATAMATION's list of top vars and among the most mature companies in this industry, the future doesn't lie in new application areas, but in putting its extensive line of software for the manufacturing sector on new machines. Accordingly, after months of discussion, the Los Altos, Calif.-based company decided to adapt its MAN-MAN Information System for IBM's 4300 minicomputer series. Just under way, the project to design the first release of MAN-MAN for the IBM line is expected to lead to a product early in 1987.



BRANIFF OF ASK: Capitalizing on market opportunities offered by IBM equipment and factory automation, both here and abroad.

With Ask's software already running on Hewlett-Packard's HP 3000 series and Digital Equipment Corp.'s VAX computers, "we believe we're committed to the right three," says Ronald W. Braniff, president, "and we'll continue to develop our product line for all of these minis."

The stories behind Ask's selection of hardware manufacturers illustrate the var's growth as a company. When Sandra L. Kurtzig, Ask chairman and chief executive officer, first began the firm in 1974, she offered her applications software, designed for manufacturing companies with annual revenues ranging from $5 million to $300 million, on Tymshare Inc.'s network. A timesharing option is available today on the var's own Asknet. But the demand among her customers to run the software on an in-house machine led Kurtzig to Hewlett-Packard, "a company that was right in our backyard and had an excellent reputation for minis," notes Braniff. "HP proved to be very helpful in the early days."

By contrast, the var's 1981 selection of DEC as its second supplier was based far more on planning than serendipity. "We spent about nine months evaluating companies," recalls Braniff, who joined Ask's board of directors in 1980. "Our decision was based on the substantial marketplace for DEC equipment, on the clear brand preference out there." By the time Ask chose the Maynard, Mass., mini maker, the var had grown up enough to know that any supplier it selected "had to provide growth for us."

Though machines with IBM's logo might have seemed a natural growth opportunity for a company like Ask from the start, they weren't, says Braniff. IBM had no var program until 1984, he points out, and

FIG. 1
THE TOP 10 VARS

COMPANY/ LOCATION/ NATIONAL OR INTERNATIONAL (N/I)	VALUE OF SYSTEMS SOLD (IN $ MILLIONS)	COMPUTERS SOLD/ COMPUTER TYPES
1. Ask Computer Systems Inc. Los Altos, Calif. (I)	45	250/HP & DEC minis; IBM minis by 1987
2. XL/Datacomp Inc. Hinsdale, Ill. (N)	36	175/IBM minis
3. Informatics General Corp. Woodland Hills, Calif. (I)	29.7	N/A/Wang minis & IBM micros
4. Istel Inc. Burlington, Mass. (I)	25	350/DEC, IBM, & Prime minis; IBM & Cromemco micros
5. Johnson Controls Inc. Carrollton, Texas (I)	25	200/DEC & Modcomp minis, DEC & IBM micros
6. Systems Associates Inc. Charlotte, N.C. (N)	17.08	82/DEC & Point 4 Data minis
7. Federal Systems Inc. St. Louis, Mo. (I)	17.045	636/DEC & IBM minis, Eagle & IBM micros
8. International Research Eval-Design Concepts Eagan, Minn. (I)	15	39/DG, DEC, HP, & IBM minis; Altos, DEC, TeleVideo, & Wang micros
9. SHL Systemhouse Inc. Arlington, Va. Chicago, Ill. San Mateo, Calif. (I)	15	100/DEC, HP, Wang, & AT&T minis
10. Loonam Computer Products Minneapolis, Minn. (N)	13	5,500/DEC, North Star, TI, & Altos micros

Source: Technical Publishing Co.'s *Survey of Systems Houses and Computer OEMs*

Ask's strategy depends on the provision of a complete hardware/software package to its customers. In addition, Armonk only began to move clearly to the price/performance of the mini market with its 4361. "The 4300 series is a mainstream product line for IBM and so offers tremendous growth opportunities for our company," Ask's president explains. "We believe that the tens of thousands of factories out there that have yet to buy our product or anyone else's will be attracted to MANMAN because it runs on IBM hardware."

In addition to their decision to rewrite MANMAN for IBM computers, Ask managers expect the company to grow beyond its 1984 net revenue of $65 million and its 850 installed systems by broadening its software product line. The firm announced seven new packages this spring. "There is an unending list of potential manufacturing applications—in fact, more than we can do in the next two to three years," says Braniff.

Growth is also expected to come from markets outside the United States. For the past five years, Scicon, a wholly owned subsidiary of British Petroleum, has served as a distributor for Ask products in the United Kingdom. Ask also has a sales office in Canada and one in Australia and supports more than a dozen U.S.-based companies with factories in the Far East. The var will build on this start abroad through a letter of intent recently signed by Ask and Hewlett-Packard whereby HP will become the reseller's sales agent in several countries around the world. Four Western European countries will be targeted first—West Germany, France, Italy, and the Netherlands. Ask is reviewing the possibility of providing direct support to its Far East customers through a sales office by 1986.

OWENS OF XL/DATACOMP: Focusing on manufacturing and the midrange market.

Back home, the company's current business plan calls for research and development "to position MANMAN to easily connect with other islands of automation in the factory," says Braniff. The R&D program is expected to yield products that will begin to link Ask's information system to computer aided design/computer aided manufacturing (CAD/CAM) and materials handling systems by the end of the year. "We're still learning here," the Ask executive adds. "We don't have it all figured out. We want an interface that is hardware independent."

XL/DATACOMP

XL/Datacomp Inc., a Chicago area-based reseller of midrange IBM equipment, went public in March, its 1.34 million shares trading for $15 apiece. After five years of operation and "lots of elbow grease," says president and chief executive officer Thomas M. Owens, the firm became one of the few companies in value-added remarketing to take on the stock market.

The firm is in a good position to do so. Datacomp is selling IBM's System/34, 36, and 38—computers that range in price from $30,000 to $300,000—to a market with an installed base of more than 130,000 sites and expanding at a compounded growth rate of 25% a year. Last year, IBM made this market even more attractive to independent sales and service organizations like Datacomp by adding distribution channels for its new midrange gear that extend beyond its direct marketing force.

Armonk launched a Value Added Remarketer program through which it discounts its System/36 to independent companies that repackage the equipment for resale with software and other services. At the same time, Big Blue reduced installation and support services for many of its new products, including the System/36. Because the company cannot afford to support it, notes Owens, "the midrange market is almost adrift from IBM."

Today, Datacomp—once restricted to purchasing used systems from the secondary market for resale with additional services like on-site maintenance, leasing, installation planning and assistance, and equipment trade-in—can now sell new machines as well. The firm became an IBM var last October through a subsidiary, XL/Systems Support Inc., which sells new System/36s. The var program accounted for 5% of the company's sales of $14.5 million in the first quarter of FY '85 that ended December 31. Growth is expected to continue.

Datacomp's Systems Support unit

This ranking includes a surprising number of vars specializing in the manufacturing marketplace.

repackages System/36s with applications software for manufacturers. "We thought this was the area that provided the greatest potential across the midrange marketplace," says Owens. Users have a particular need for such software, he contends, because the package IBM offers in this field is so difficult to use. Datacomp is evaluating other applications to target in the future.

As far as becoming a var for hardware made by another manufacturer, Datacomp has no immediate plans. If the firm went this route, "we'd probably choose DEC," comments Owens. "But we're so busy in terms of the volume and the kind of growth we're experiencing that we're not thinking that way right now." With revenue growth of 61% annually since 1980, Datacomp's whole orientation is toward Big Blue. Owens came to the company in 1979 after 20 years in marketing positions with IBM, and most of the members on the firm's management team have at least 15 years of selling for the computer giant on their résumés.

Datacomp has opened seven sales offices around the country and three warehouses, in Chicago, northern New Jersey, and Los Angeles. Its employees number 150. The firm plans to be in 12 cities by the end of 1985 and in 27 metropolitan areas two years from now. Its management will use some of the $10.8 million raised by the public offering—handled by Smith Barney, Harris Upham & Co. Inc. of New York—to increase inventories on attractive terms and to reduce the firms's already low debt. Owens suggests the firm will also be on the lookout for other vars to buy.

Indeed, he fully expects to see "a lot of consolidation among vars, because manufacturers will not be interested in dealing with several small resellers. Manufacturers are interested in reducing their administrative burden," the reason that var programs proved attractive to hardware makers in the first place. If that burden grows as the manufacturer takes on more vars, the remarketers can expect a shakeout.

INFORMATICS GENERAL CORP.

Over the past four years, Informatics General Corp. has either entered or expanded its presence in four vertical markets by acquiring five small vars that specialized in those fields. These markets—public accounting, law, construction, and retailing—have become a part of the company's Informatics Applications organization, a major unit that last year saw its revenues grow 60% to nearly $88.3 million and its operating profit soar 85% to just under $9.7 million.

Overall, the company's 1984 revenues edged over $191 million and its income approached $6.3 million. The firm's other major organization—Information Systems, which offers professional services and software products like micro-to-mainframe links—grew only 4%, with revenues rising to a little more than $101 million while operating profits declined substantially from almost $9.45 million to $4.74 million.

PAPARELLI OF INFORMATICS: Building top-flight marketing and distribution channels.

Despite Informatics Application's healthy growth last year, there will be no more acquisitions in 1985, says Charles J. Paparelli, group vice president of Business Management Systems, the part of the firm's var organization that has absorbed most of these acquisitions. Instead, the company will consolidate its current holdings and concentrate on building top-flight marketing and distribution channels—particularly for low-end, or micro-based, systems that range in price from $12,000 to $25,000 with hardware.

"Ideally, when you acquire a company, you get a strong marketing and distribution system along with an excellent product, good support, and first-rate technical people," observes Paparelli. "But in reality, a firm that is good at marketing and distribution is hard to find." Informatics' strategy has been to buy firms that it believes have top products and people in these vertical markets, and then to spend time creating a sales organization for them.

For the past two and a half years, the company has been working on its independent sales network, signing select dealers in the United States and Canada to sell its IBM PC-based products. Paparelli says the requirements are strict and the financial commitments tough. The chosen must take an intensive course in selling Informatics' products, and the company prefers that the dealers who apply have sales experience in the relevant vertical market. Just how many dealers it has now, the firm won't reveal.

Informatics reserves for its direct sales force those applications built around machines more complex than the single-user personal computer. "Many dealers simply aren't prepared for this market yet," comments Paparelli. "The low-end market, with its price barriers and larger audience, is more forgiving." The Informatics executive, however, fully expects that as vertical markets mature and dealers come to understand them, independent sales organizations will be able "to move up through the vertical to more sophisticated equipment."

Paparelli believes that the maturity of a vertical market is a key factor in the ability of a dealer, or his own direct sales force, to penetrate it. With some 6,000 systems installed, the Informatics Accounting Pro Series for CPAs is "the most mature market we've got. We don't have a user base this size in any of our other markets."

The group vp contrasts the computer savvy of accountants with that of construction contractors and property managers. "We're fighting the battle of maturity in these verticals," he says. "They've accepted computers, but remain on the bottom half of that acceptance curve, compared with CPAs. The CPA knows he needs automation and what he needs it for. But we have to tell the construction contractor why he needs our system and how he might use it." Adds Paparelli, "That makes for a longer and more expensive sales cycle." As a result, the products Informatics and others sell to these markets tend to be more expensive than the vertical solutions for more mature markets.

For Paparelli, the greatest challenge in the var business "is building an organization at the same speed at which the market is maturing." He suggests that too many resellers tend to throw money at the problem of an underdeveloped vertical, assuming that the answer is marketing when it may simply be "sitting back and waiting for the explosion to happen."

ISTEL INC.

Like Ask Computer Systems and XL/Datacomp, Istel Inc. of Burlington, Mass., has concentrated its value-added reselling efforts on the factory. Indeed, the principal strategy of this privately held company—whose stock is owned by automotive giant

Growth is also expected to come from markets outside the United States.

British Leyland, which, in turn, is an asset of the British government—is "to extend ourselves more adventuresomely in the manufacturing market," says Seymour A. Rosen, president of the firm.

But the course that Istel has mapped out for itself has an interesting twist: the company is just as committed to data communications as it is to manufacturing, and thus marries the application and the utility in the var solutions it offers clients like General Motors and NCR—something Ask, for example, is just beginning to do. "Communications has to be a major area for growth in the years ahead," adds Rosen. "It just has to be."

Istel is well positioned in both fields. The U.K.-headquartered company's main software packages, a system for discrete event simulation called See-Why, won the British Computer Society's Applications Award in 1981 for the best new application of the year and is installed in several major U.S. manufacturing companies. This program and the other software packages that Istel sells are oriented more toward manufacturing analysis than operations.

In Britain, Istel is a U.K. Department of Trade and Industry approved consultant in computer aided design and computer aided manufacturing and the application of micros on the factory floor. Drawing first on its experience in helping British Leyland companies modernize and improve productivity through automation, the firm has been selling its approach to the manufacturing vertical market in the U.S. for the past four years.

Back across the Atlantic, meanwhile, Istel has a hefty reputation as a communications company. Its private communications network covers the U.K. It has developed both an electronic mail service, dubbed Comet, and built a nationwide videotex service named Viewshare. Istel also provides communications services for value-added networks in Britain and has installed broadband local area networks for manufacturers for some time now.

Istel has 1,200 employees worldwide and, while a good deal of its business is in the United Kingdom, the United States is its next biggest source of revenue. Because it is a private firm, the company won't say what those sales were for 1984, but, according to Rosen, its var business—both turnkey and custom—makes up just under half of its volume. Since the British government is gradually selling off assets like British Leyland, Istel expects to be sold at some point in the future.

The company isn't wedded to a single hardware manufacturer. Instead, it offers its manufacturing software on the full range of computers made by IBM, as well as minis from Prime Computer and Digital Equipment and micros from Cromemco. For Rosen, an IBMer for 15 years, a major pitfall in remarketing is being tied too closely to one computer maker or one machine. "If, one day, the system is no longer in vogue, you're in trouble," he says. "The key to avoiding this problem is to make your applications software as portable as possible," and to do so from the very beginning.

FEDERAL SYSTEMS INC., FEDERAL COMPUTER CORP.

For 10 years, Robert A. Hummel and Gary W. Leiendecker talked about going into business for themselves. They had first met and worked together in the early '70s at Singer Business Machines before that firm decided to leave the computer field, and then remained friends as Leiendecker went to work designing computer systems for steel mills and Hummel sold dp gear to the federal government. As the steel business hit the skids and Hummel tired of working for others, the two men discussed the possibility of forming a company of their own.

Toward the end of the 1981-82 recession, they took the plunge, opening their doors for business as sister companies located in St. Louis, Mo., and Fairfax, Va., that would focus on selling "integrated equipment solutions" to the U.S. government. Today, Leiendecker, president of Federal Systems Inc., and Hummel, president of Federal Computer Corp., believe their initial growing pains are over. In 1983, the combined companies sold the feds some 636 computer systems worth more than $17 million. Their 1984 sales amounted to some $30 million and they employ approximately 25 people in the two locations.

Hummel and Leiendecker were attracted to the government marketplace primarily because of its size. "The government is still the biggest dp user in the country," says Leiendecker, and with a total of 40 years of dp experience on several types of computers, the two thought they could meet the needs of a big user with a multitude of requirements.

To be competitive in this marketplace, Federal Systems and Federal Computer do not specialize in any one manufacturer's hardware. Instead, "we attempt to decipher an agency's needs and to come up with the best solution to handle a particular problem," explains Leiendecker. Adds Hummel, "There are some pieces of hardware that, through experience, we know better than others, so we tend to gravitate toward them. But we don't rule anything out." The two firms frequently propose systems built around DEC and IBM minis and IBM and Eagle micros, as well as peripherals from Telex, Control Data, and Memorex.

The packages they put together for federal agencies include the hardware, operating system software, and maintenance—either subcontracted out to the manufacturer or a third party—but no applications packages. The requirements of their first client three years ago typify the tasks the two companies tend to take on: an Army unit on the East Coast needed peripherals for a system it already had in-house, and they supplied the agency with printers, card readers, and card punches. The largest federal job Hummel and Leiendecker have won was worth approximately $25 million, although they have bid on contracts valued at $250 million.

As they look toward the future, Federal Computer and Federal Systems hope to increase the size of the government contracts they win. Hummel and Leiendecker believe they have established a solid track record with agencies, pointing proudly to the fact that "we have never defaulted on a contract." They also expect the business to grow because of the place they have held for the last year on the General Services Administration's computer schedule, a kind of shopping list of preapproved vendors that agencies can turn to for equipment.

But now, comfortable selling solutions to this marketplace, the two dp professionals say they are ready to branch out into commercial sales. Federal Computer has opened a retail store in Virginia that specializes in micros. It is geared to corporate clients with a particular requirement for local area networks, and Federal Systems expects to follow suit in Missouri sometime next year.

The biggest problem in this business is an ongoing one: selecting the right alliances with manufacturers. "The key is to have the products that the end users want. If your alliances with companies are poorly chosen, it's difficult to satisfy those customers," he says. Good relationships with manufacturers, Hummel adds, are usually dependent on no more than good business practices—with one exception. "The main product that everyone has to deal with is the IBM PC, and there is no way to control a giant like IBM." Having enough IBM micros in stock and ready for customer sites is a constant source of concern. Notes Hummel, "Like everyone else dealing with IBM in the business, some days there's a feast, and some days, a famine."

An international survey sheds new light on the personalities of data processors.

THE DP PSYCHE

by Michael L. Lyons

The term "programmer personality" has become cliché. Even so, all the managers and technical professionals that we at NT Systems Corp. have talked to over the years acknowledge that computer folk are, in some undefined way, different from other folk. This article will examine some of the whys and wherefores of this common perception.

For the past three years, we've been conducting a survey of the personalities and work preferences of computer professionals employed by over 100 different companies. Although a large number of computer professionals have already participated in the survey, data are still being collected to study specific jobs and industries.

We are not trying to define or classify any typical personality. One might just as well try to describe a typical company.

At this time a total of 1,229 individuals have participated in the survey, 213 of whom work overseas in Australia and Great Britain. Almost all work for large to very large firms, including insurance companies, financial institutions, utilities, and hardware manufacturers.

There are more than twice as many men (73%) as women (27%) in the survey population. This difference is probably representative of the computer industry as a whole, which has historically attracted more men than women.

As shown in Fig. 1, about half of the people are in their thirties, with the women slightly younger than the men. The median age for the women is 31, while the men's median age is 34.

The survey participants are a well-educated group; of those supplying education information, about one half have a four-year-college degree and one fifth hold graduate degrees. A higher percentage of women have college degrees, but more men hold advanced degrees.

Fig. 1 also shows that about 30% of the population has been working in computing for five years or less, and over a third have more than 10 years of computing experience. The median is seven years for women and 10 years for men.

20% WORK AS MANAGERS

Finally, a breakdown of the jobs held by the survey participants is given in Fig. 1. Almost 20% of the people surveyed are in management positions—some as directors and a few as vice presidents. Project managers, supervisors, and team/project leaders accounted for about another 20%. A higher percentage of men than women hold management positions. This difference may be due to the fact that the men in the survey population are somewhat older, with more years of computing experience.

The Myers-Briggs Type Indicator (MBTI) was used to assess the psychological types of the individuals participating in the survey. It is based on Carl Jung's theory of psychological type, which describes how people's behaviors are not random, but differ in certain consistent, fundamental ways.

The MBTI has been well researched and widely accepted over the past 20 years. We have been using it with considerable success in our dp consulting and training courses for the past five years.

The Myers-Briggs model of personality type is inherently nonevaluative and easy to learn. As with most programming languages, though, appreciation of its capabilities and usefulness increases with knowledge and experience. Recent articles appearing in DATAMATION (e.g., "In Search of the Perfect Programmer," March 15, p. 128) have introduced readers to the MBTI model and presented some findings on small groups of programmers.

Just as people tend to favor or prefer either their right or left hands, they also tend to make other choices very early in life that help to explain their behavior and attitudes. Through repeated use and reliance, these choices are strengthened into the four personality preferences that determine one's psychological type.

Each of the factors is described as one of the following eight personality preferences:

- extraversion or introversion
- sensing or intuitive
- thinking or feeling
- judging or perceiving

Of course, people can and do use all eight preferences. In each of the four pairs, however, we all have one preference that is stronger than the other, one that works better for us than its complement.

The combination and interaction of an individual's four personality preferences produces one of 16 psychological types. While an individual's personality includes far more than his or her type, the use of type can provide a very effective tool for understanding and improving interpersonal communications. The Myers-Briggs model provides a means for understanding and appreciating ourselves, others, and how we differ.

Before we can take a look at some of the different psychological types, we must describe each of the eight personality preferences.

The choice between extraversion (E) and introversion (I) reflects one's basic orientation, either outward or inward. Someone with a preference for E tends to live more in the outer world of people,

things, and action. The introvert is more comfortable in the inner world of ideas.

The E usually receives energy when interacting with the "outside world," while the I is exhausted by the outside world but is energized through solitary activities. An E is usually very comfortable with new groups of people, while an I prefers to deal with people one-to-one or in small, known groups.

As can be seen in Fig. 2, fully two thirds of the survey participants were found to be introverts. In the general population one would expect to find the reverse—more than two thirds preferring extraversion. Part of this difference may be due to the fact that more Is than Es pursue advanced education, and the survey population is very well educated.

The E-I difference may also be due in part to how computing careers are perceived. Not many extraverts would relish the thought of performing solitary programming activities, day after day. Yet it is precisely this sort of activity that appeals to many Is. This issue is fast becoming moot as the diversity of jobs available in computing increases, and more students study dp not for its special appeal but for monetary reasons.

It is interesting to note that the managers and supervisors in the group had almost the exact same two-thirds bias for Introversion. This may be due to a general tendency in computing to promote some of the best technical people (very often Is) into management. The additional extraversion required by managerial positions makes this transaction more difficult for the I than for the E.

RELYING ON THE SENSES

The choice between sensing (S) and intuitive (N) determines how one prefers to take in data, to perceive. The person with a preference for sensing tends to rely on his senses, what is real now, and what has been experienced. The intuitive person prefers to look for meaning and possibilities, beyond the information supplied by the senses.

Sensing types tend to be practical, realistic, and observant. Intuitives put more emphasis on imagination, creative problem solving, and new projects. One can generalize that an S will often prefer to perform a task in a particular fashion because he has done so before and it has worked. The N will prefer to perform the task some other way, for the very same reason! Since there are few organizations that allow such freedom, Ns are more often bored with their work.

Fig. 2 shows that the survey population was divided almost evenly between sensing and intuitive. In the general population one would expect to find 70% to 75% of the people with an S preference. The educational level of the group may account for some of this difference, as more Ns than Ss pursue higher education.

Quite a bit of sensing behavior is required of the managers and supervisors who must define and enforce procedures, and who often determine and monitor schedules. But there was no appreciable difference between the managers and supervisors and the rest of the survey popula-

FIG. 1

DESCRIPTION OF SURVEY POPULATION

AGE DISTRIBUTION

	MALE		FEMALE		ALL	
	N	%	N	%	N	%
< 25	39	4.3	31	9.5	70	5.7
25-29	195	21.6	104	31.9	299	24.3
30-34	268	29.7	87	26.7	355	28.9
35-39	220	24.4	74	22.7	294	23.9
40-45	110	12.2	20	6.1	130	10.6
> 45	71	7.9	10	3.1	81	6.6
Totals	903	100%	326	100%	1229	100%

EDUCATIONAL LEVEL

	MALE		FEMALE		ALL	
	N	%	N	%	N	%
No college	96	10.6	20	6.1	116	9.4
Some college	172	19.0	54	16.6	226	18.4
4 year degree	387	42.9	181	55.5	568	46.2
Masters	179	19.8	55	16.9	234	19.0
Doctorate	28	3.1	4	1.2	32	2.6
Not given	41	4.5	12	3.7	53	4.3
Totals	903	100%	326	100%	1229	100%

YEARS IN COMPUTING

	MALE		FEMALE		ALL	
	N	%	N	%	N	%
<3	54	6.0	41	12.6	95	7.7
3-5	170	18.8	102	31.3	272	22.1
6-10	294	32.6	96	29.5	390	31.8
11-15	223	24.7	61	18.7	284	23.1
>15	143	15.8	23	7.1	166	13.5
Not given	19	2.1	3	.9	22	1.8
Totals	903	100%	326	100%	1229	100%

TYPE OF JOB

	MALE		FEMALE		ALL	
	N	%	N	%	N	%
Programmer	76	8.6	61	18.7	137	11.1
Programmer/Analyst	92	10.2	47	14.4	139	11.3
Analyst	103	11.4	41	12.6	144	11.7
Systems Programmer	49	5.4	14	4.3	63	5.1
Engineer	127	14.1	21	6.4	148	12.0
Team/Project Leader	68	7.5	13	4.0	81	6.6
Supervisor	54	6.0	34	10.4	88	7.2
Project Manager	45	5.0	14	4.3	59	4.8
Management	187	20.7	51	15.6	238	19.4
Other	102	11.3	30	9.2	132	10.7
Totals	903	100%	326	100%	1229	100%

tion with respect to sensing and intuition.

In different kinds of organizations, the S-N distribution may vary considerably, depending on two factors: 1) Does the kind of work being done appeal more to an N or an S?; and 2) Is the organization selecting for Ns or Ss in its hiring practices? In particular, we've observed that R&D organizations and firms that do a lot of state-of-the-art development attract and hire more Ns than Ss. The opposite occurs in large organizations where the bulk of the work involves maintaining and enhancing production systems.

A great many of the communication difficulties experienced on the job are based on an S vs. N difference. The customer or user with a strong S preference isn't interested in what might be done, but rather in what will be done and when. The systems designer with a strong N preference may have difficulty ending the design process and moving on to implementation.

In the next set of preferences, thinking and feeling, the choice is between two rational judging processes. People who make decisions on a logical and impersonal basis demonstrate a thinking (T) preference. Those who make decisions in a more subjective fashion, based on personal values, have a preference for feeling (F).

An F preference must be carefully distinguished from the term "feelings" as commonly used. It is quite distinct from emotions and similar feelings. Feeling is an especially appropriate judging process when dealing with people, as the personal values involved on both sides are always included in the process. Ts are at their best when their decisions require impersonal analysis, logic, and consistency.

Over 80% of the survey population had a thinking preference, as shown in Fig. 2. This is an exceptionally strong ratio of thinking to feeling. In the general population, about 60% of women have an F preference and about 60% of men have a T preference. The bias toward the T preference was strong for both the women and the men, with about 70% and 85% respectively. Approximately 83% of the managers and supervisors preferred thinking to feeling.

It has been our experience that some computer professionals with an F preference have done so well at developing their T function that they can function as Ts at work and may be reported as Ts on the MBTI. They are able to set aside their feeling preference and exert effort to meet the demands of technical work and the expectations of their associates (Ts).

While most jobs in computing require a well-developed T process to deal with the immutable demands of hardware and software, such is not the case in most management positions. In supervisory and management positions, where the emphasis should be on people issues more than technical issues, a well-developed F process may prove very useful. The very successful programmer, analyst or engineer with a strong T preference (and probably also an I preference) faces a particularly difficult transition when promoted into management.

Those with a judging (J) preference tend to live in a planned, orderly fashion and like to exercise control over their lives. They like to have things completed and issues resolved. Decisions can be made by those with a J preference whenever they believe they have the required essential information.

Those with a perceiving (P) preference tend to live in a more flexible, reactive manner, wishing to understand and adapt to life. They like to remain flexible and keep their options open. Those with a strong P preference may never have sufficient information to be truly comfortable making important decisions.

WOMEN PREFER J TO P

In Fig. 2 we see that approximately two thirds of the survey population had a judging preference. This compares with a roughly equal distribution in the general population. Slightly more women than men preferred J to P.

It's quite possible that computing holds a special attraction for people who prefer a linear, systematic approach to problems—Js. Also, some Ps are undoubtedly being eliminated from consideration for entry-level positions due to a lack of specific educational prerequisites. School/college systems, rules, and procedures are more of an obstacle for Ps than for Js, and they are more likely to drop out of formal education programs.

You'd expect managers in any industry to demonstrate a high bias toward J, since the responsibilities of the job usually require a good deal of J behavior. Decisiveness, working from a plan, and organization are among the J traits expected of managers. But there was no difference in the J-P distribution between the managers and supervisors and the rest of the survey population.

Those with a strong P preference may run into difficulties in large organizations. They are required to adapt to procedures and systems for which they personally have little interest or use. Ps tend to take deadlines less seriously than Js, and often rely on a great "last minute" effort to get the work done.

A difference in J-P attitude is second only to an S-N difference in causing communication problems between people with different preferences. J-P would probably rank first, except that most Ps have learned at school and at work to adapt to predominately J organizations.

Fig. 3 reveals the distribution of the four combinations of perception and judgment: sensing-thinking (ST), sensing-feeling (SF), intuitive-feeling (NF), and intuitive-thinking (NT).

Approximately 39% of the survey population are STs. People with a sensing-thinking combined preference are usually concerned with facts. They tend to be practical, down-to-earth individuals. Many technical areas in data processing are of interest and well suited to the ST.

The data processor is often characterized as having the attributes of an ST (and of a J as well). STs usually like working in large organizations that provide a clear hierarchy, job descriptions, promotional opportunities, and job security. They are

FIG. 2
PERSONALITY PREFERENCES

	MALE		FEMALE		ALL	
	N	%	N	%	N	%
Extraversion (E)	272	30.1	132	40.5	404	32.9
Introversion (I)	631	69.9	194	59.5	825	67.1
Sensing (S)	413	45.7	156	47.9	569	46.3
Intuitive (N)	490	54.3	170	52.1	660	53.7
Thinking (T)	771	85.4	223	68.4	994	80.9
Feeling (F)	132	14.6	103	31.6	235	19.1
Judging (J)	572	63.3	236	72.4	808	65.7
Perceiving (P)	331	36.7	90	27.6	421	34.3

Judging personalities live in a planned, orderly fashion; perceivers prefer a more flexible, reactive manner.

far less likely to join a startup company.

Accounting for only about 7% of the survey population, sensing-feeling types are clearly in the minority. This is not surprising as the field of computing/data processing offers little of interest to SFs. Their primary orientation is to help others by performing tasks that provide direct, tangible benefits. SFs tend to be friendly and sympathetic individuals.

While SFs may be drawn to business and applied science, they are usually more interested in the health, sales, or teaching fields. The majority of SFs one finds in computing will have preferences for introversion and judging. Other SFs may find specific jobs or niches within a dp organization that suit their preferences. The SFs that can't find such a job may decide computing was an unsatisfactory career choice and leave it.

Somewhat better represented in the survey population are the NFs, comprising 12% of the total. Those with an intuitive-feeling orientation are concerned primarily with understanding and communicating with others. They are always on the lookout for new possibilities for themselves and others. NFs tend to exhibit considerable insight and enthusiasm.

Many NFs are drawn to fields like psychology, teaching, and writing; the technical aspects of computing hold little long-term attraction. One would expect that many find their niche in the less technical, more people-oriented positions in the business. For example, an NF would tend to be much happier as a systems analyst with direct user contact than he would be developing microcode for a new processor.

FIG. 3
COMBINATIONS OF PERCEIVING & JUDGING PREFERENCES

MALES		FEMALES		ALL	
ST	SF	ST	SF	ST	SF
40.8%	5.0%	35.0%	12.9%	39.2%	7.1%
44.6%	9.6%	33.4%	18.7%	41.7%	12.0%
NT	NF	NT	NF	NT	NF

FIG. 4
TYPE CHART OF COMPLETE SURVEY POPULATION

	ALL – N = 1229		MALE – N = 903		FEMALE – N = 326	
	N	%	N	%	N	%
ISTJ	278	22.6	222	24.6	56	17.2
ISFJ	48	3.9	22	2.4	26	8.0
INFJ	33	2.7	18	2.0	15	4.6
INTJ	191	15.5	146	16.2	45	13.8
ISTP	64	5.2	47	5.2	17	5.2
ISFP	18	1.5	11	1.2	7	2.1
INFP	44	3.6	36	4.0	8	2.5
INTP	149	12.1	129	14.3	20	6.1
ESTP	26	2.1	22	2.4	4	1.2
ESFP	9	.7	6	.7	3	.9
ENFP	42	3.4	24	2.7	18	5.5
ENTP	69	5.6	56	6.2	13	4.0
ESTJ	114	9.3	77	8.5	37	11.3
ESFJ	12	1.0	6	.7	6	1.8
ENFJ	29	2.4	9	1.0	20	6.1
ENTJ	103	8.4	72	8.0	31	9.5

WORKING CLIMATE IMPORTANT

The climate of the work group is of great importance to both NFs and SFs. In fact, it is often more important than the work itself. Therefore, they try to help their associates achieve and maintain good working relationships. This important team-building function is neglected in working groups of Ts.

About 42% of the survey population had an intuitive-thinking combined preference. Slightly more men are NTs than are STs, while the reverse is true for the women surveyed.

The NT individual is usually most interested in technical developments and relevant theories and models. Like NFs, the NTs look for new possibilities, but NTs tend to overlook the human elements in favor of the technical.

NTs are heavily represented in R&D organizations. In most dp organizations NTs will be attracted to areas engaged in major systems development activities. Once all the conceptual work on a project has been done, however, many NTs prefer to start working on something new. They will usually try to avoid work that is similar to what they have already done. NTs always seem to be looking for new challenges.

Fig. 4 shows the entire survey population. One's personality type is defined by the four letters, representing one's four personality preferences: extraversion (E) or introversion (I), sensing (S) or intuitive (N), thinking (T) or feeling (F), judging (J) or perceiving (P).

The personality type with the highest occurrence, almost 23%, is ISTJ—the combination of introversion, sensing, thinking, and judging. ISTJs assume responsibility readily and tend to be very dependable and persevering. They usually maintain a conservative outlook and avoid taking any unnecessary risks.

An ISTJ is likely to feel very much at home in a large conservative organization with well-defined policies and procedures. They will gravitate toward secure positions and try to avoid areas like sales, user liaison, and training.

The next two most frequently occurring types in the population are the two introversion-intuitive-thinking types, the INTJ and the INTP. The INTJ is the more likely of the pair to follow a project through to implementation and thus achieve the closure that *J*s seek. INTPs will often prefer to leave the implementation of their grand designs to others, if they believe their work will be carried on properly. Both INTs have a low tolerance for error in their own work or for what they see as incompetence in the work of others.

As a result of the *J* preference, the

President Ronald Reagan

"U.S. Savings Bonds can mean a brighter future for you...and America." I'm appealing to *every* American to support the U.S. Savings Bonds program.

With today's competitive-rate Bonds, you can earn higher market-based interest *and* at the same time play an important role in America's growth and prosperity. Last year alone, U.S. Savings Bonds saved our Treasury nearly $2 billion. That's something every taxpayer benefits from.

Why not serve your country while you save. Buy U.S. Savings Bonds through your Payroll Savings Plan where you work. It's the way to build up your savings while you build a better America.

U.S. SAVINGS BONDS Paying Better Than Ever

INTJ tends to be more organized and to do more planning than the INTP, who would usually prefer to be working on a current problem or learning something that might help solve a future problem. In computing, the INTP is often very happy pursuing a technical career path, if one is available, while the INTJ is more likely to actively seek a management position.

These three personality types—ISTJ, INTJ, and INTP—account for just over 50% of the survey population. Examination of additional survey data will be required to study different industry groups, specific jobs, and areas of expertise and specialization.

Many organizations have a very strong bias toward certain personality preferences or even specific psychological types. This is partially due to the nature of the work being performed, but may also be caused by managers who hire "in their own image." People sharing the same psychological type usually communicate and get along well when they first meet each other. Most managers think well of themselves, and, after all, they have been successful in their careers.

These days there are very few solo performers in most computing organizations. People have to work together in teams of some sort, and it is almost always good to have some diversity on the team in terms of psychological type. It would be great if there were a simple rule that one could follow—such as, "put an F on every team"—that would assure success, but such is not the case.

Each team must be considered individually. Differences in psychological type may produce some initial friction within the team, but a better functioning team will result if those initial difficulties are dealt with and resolved early. An understanding of psychological type can be extremely effective in helping with team or other interpersonal conflicts.

Don't be concerned about guessing people's types accurately, just try to be aware of how their personality preferences may differ from your own. We have found that simply being aware that a person may be of a different type and taking that potential difference into account can greatly improve communication.

After all, it's often not a question of right or wrong, but of how one looks at things. ●

Michael L. Lyons is president of NT Systems Corp. and has 20 years of experience in consulting, managerial, and technical positions. He is currently conducting a major research project on the personality and work preferences of computing professionals in the U.S., U.K., and Australia. Readers interested in participating in Mr. Lyons's survey may contact him at NT Systems Corp., 20942 Seacoast Circle, Huntington Beach, CA 92648, (714) 960-6770.